REMARKS

Favorable reconsideration of this application is respectfully requested in view of the following remarks.

A number of the dependent claims in this application have been amended to improve the form and readability of the claims and thereby address the concerns raised on page two of the Official Action concerning grammatical and idiomatic errors in the original claims. With respect to the recitation of "said corner" in line two of original Claim 10, it is respectfully submitted that antecedent basis exists for such term by virtue of the earlier recitation of "a corner" in the claims.

In light of the foregoing, withdrawal of the claim rejection based on the second paragraph of 35 U.S.C. § 112 is respectfully requested.

The language in Claim 1 referring to the rotor disposed side of the housing has been changed because Claim 1 does not refer to the rotor. Claim 1 now recites that the hydrodynamic pressure groove is formed at a portion of an inner surface of the housing at the side of the side of the impeller rotational torque generation section (i.e., the impeller rotational torque generation section side) or at a portion of a surface of the impeller at the impeller rotational torque generation section side.

The claimed subject matter of this application pertains to a centrifugal blood pump apparatus. The centrifugal blood pump apparatus comprises a housing having fluid inlet and outlet ports, a centrifugal pump section comprising an impeller having a first magnetic material and rotatable inside the housing to feed a fluid by centrifugal force generated during rotation of the impeller, and an impeller rotation torque generation section for attracting and rotating the impeller. A hydrodynamic pressure groove is formed at a portion of the inner surface of the housing at an impeller

rotational torque generation section or at a portion of a surface of the impeller at the impeller rotational torque generation section side, with the impeller being rotatable without contacting the housing by virtue of the action of the hydrodynamic groove. In addition, an electromagnet is provided to attract the first magnetic material of the impeller, or a second magnetic material provided on the impeller separately from the first magnetic material, in a direction opposite to the direction in which the impeller rotational torque generation section attracts the first magnetic material to help levitate the impeller.

The Official Action sets forth a rejection of independent Claim 1 based on the disclosure in U.S. Patent No. 6,155,969 to *Schima et al.* This document discloses a centrifugal pump that includes a pump head 1 containing a pump rotor 3 driven by a drive rotor 64. Fluid inters the pump head 1 through an intake 11 and is discharged through an outlet 12. The rotation of the pump rotor 3 is carried out by virtue of magnets 33 on the rotor 3 and magnets 7 on the drive rotor 64. In addition, the rotor 3 is magnetically mounted in the intake 11 of the pump head by virtue of a permanent magnet 34 accommodated on the rotor tip 49 and an annular magnetic arrangement 35 situated around the intake 11.

One of the differences between the centrifugal blood pump apparatus at issue here and the disclosure in *Shima et al.* is that the centrifugal pump disclosed in *Shima et al.* does not include an electromagnet that attracts first magnetic material of the impeller, or second magnetic material provided on the impeller separate from the first magnetic material, in a direction opposite to a direction in which the impeller rotational torque generation section attracts the first magnetic material. To further highlight this difference, Claim 1 is amended to recite the control mechanism that

controls the impeller rotational torque generation section and the electromagnetic to start rotation of the impeller rotational torque generation section with the electromagnet attracting the impeller thereto under a force not less than a predetermined value.

Thus, in the centrifugal blood pump apparatus at issue here in which the impeller rotates without contacting the housing by virtue of the operational effect provided by the hydrodynamic pressure groove, levitation of the impeller is assisted to thereby achieve a desired spacing or distance between the impeller and the housing. This advantageously contributes to reducing generation of hemolysis. Also, it is not necessary to provide a position sensor and so the overall apparatus can be made more compact and consumes less electric power. In addition, this arrangement achieves a preferable start of impeller rotation and helps prevent hemolysis of blood present between the impeller and the housing at the initial time the impeller is rotated.

As noted above, *Shima et al.* does not disclose providing an electromagnet that attracts magnetic material of the impeller in a direction opposite the direction in which the impeller rotational torque generation section attracts the first magnetic material. It thus necessarily follows that *Shima et al.* also does not disclose utilizing a control mechanism that controls the impeller rotational torque generation section and the electromagnet as claimed.

It is noted that the recitation of the claimed control mechanism was previously set forth in Claim 7. The Official Action addressed Claim 7 by noting the disclosure at the bottom of column 4 of *Shima et al.* However, this portion of the *Shima et al.* disclosure merely describes that a check back signal for magnet position can be

determined from either the impedance of the coils 46 or by position sensors. This is not a disclosure of a control mechanism that controls an impeller rotational torque generating section and an electromagnet to start rotation of the impeller rotational torque generating section with an electromagnet attracting the impeller thereto at a force not less than a predetermined value as recited in independent Claim 1.

It is thus respectfully submitted that the claimed centrifugal blood pump apparatus recited in independent Claim 1, and the various dependent claims, is patentably distinguishable over the disclosure contained in *Shima et al.*

Claims 2-6 and 8-12 recite additional distinguishing aspects associated with the centrifugal blood pump apparatus at issue here. As those dependent claims are allowable at least by virtue of their dependence from allowable independent Claim 1, a discussion of the additional distinguishing features is not set forth at this time.

Early and favorable action with respect to this application is respectfully requested.

Should any questions arise in connection with this application or should the Examiner believe that a telephone conference with the undersigned would be helpful in resolving any remaining issues pertaining to this application the undersigned respectfully requests that he be contacted at the number indicated below.

Respectfully submitted,

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